

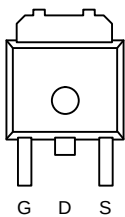


N-Channel 20-V (D-S) 175°C MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A) ^a
20	0.012 @ $V_{GS} = 10$ V	40 ^c
	0.026 @ $V_{GS} = 4.5$ V	27 ^c

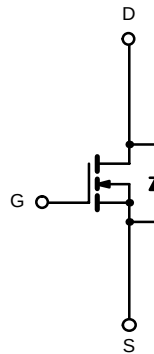
TO-252



Top View

Order Number:
SUD50N02-12P

Drain Connected to Tab



N-Channel MOSFET

FEATURES

- TrenchFET® Power MOSFET
- 175°C Junction Temperature
- PWM Optimized for High Efficiency

APPLICATIONS

- High-Side Synchronous Buck DC/DC Conversion
 - Desktop
 - Server

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current ^a	$T_C = 25^\circ\text{C}$	I_D	40 ^c	A
	$T_C = 100^\circ\text{C}$		28 ^c	
Pulsed Drain Current		I_{DM}	90	
Continuous Source Current (Diode Conduction) ^a		I_S	4	
Maximum Power Dissipation	$T_C = 25^\circ\text{C}$	P_D	33.3	W
	$T_A = 25^\circ\text{C}$	P_D	6 ^a	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 175	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient ^a	$t \leq 10$ sec	R_{thJA}	20	25	$^\circ\text{C/W}$
	Steady State		40	50	
Maximum Junction-to-Case		R_{thJC}	3.7	4.5	

Notes

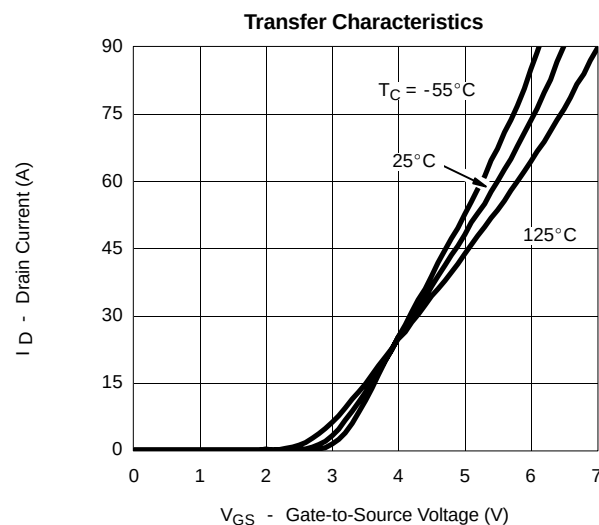
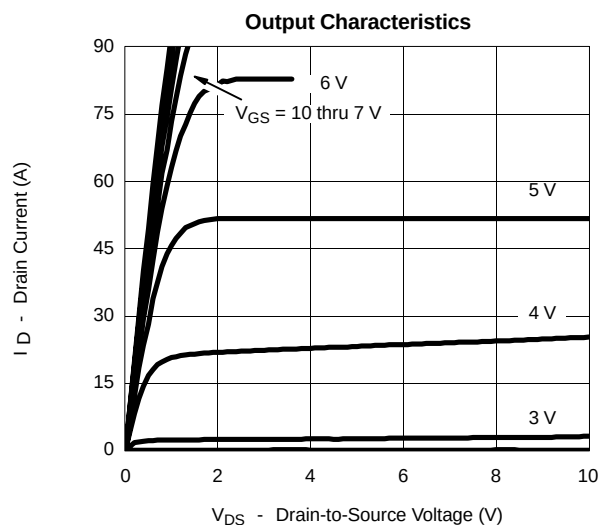
- Surface Mounted on FR4 Board, $t \leq 10$ sec.
- Limited by package
- Based on maximum allowable Junction Temperature. Package limitation current is 30 A.

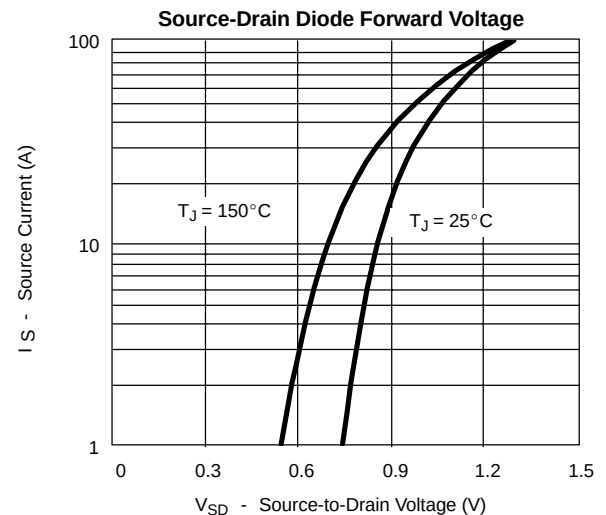
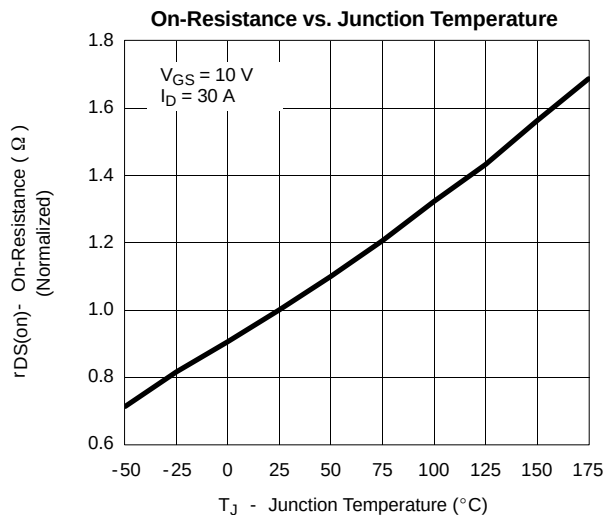
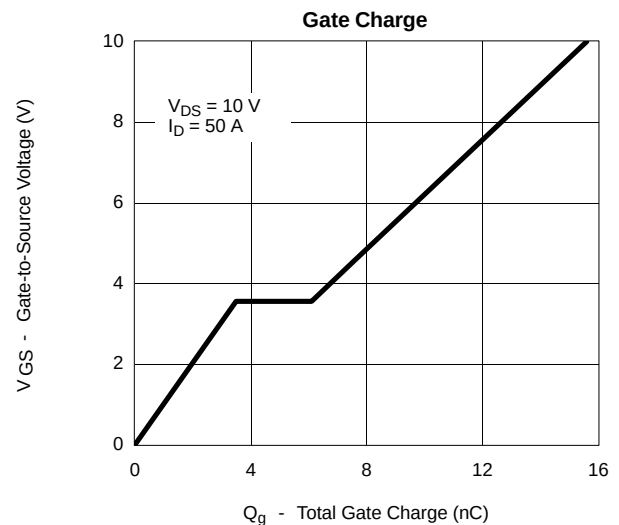
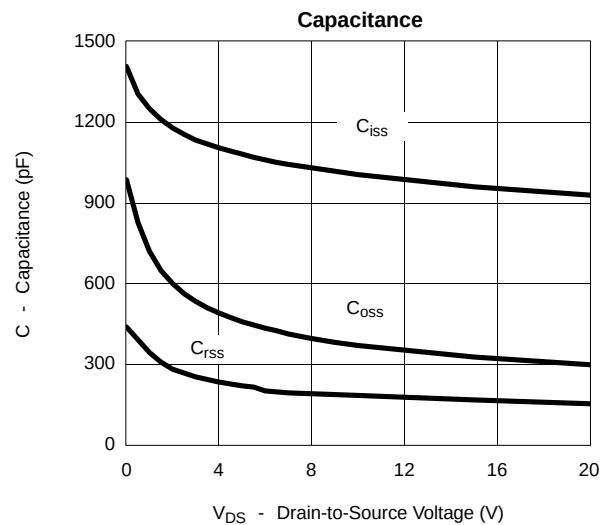
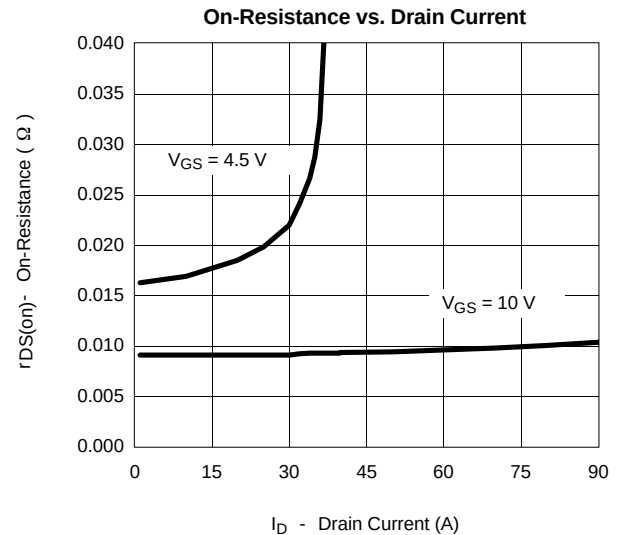
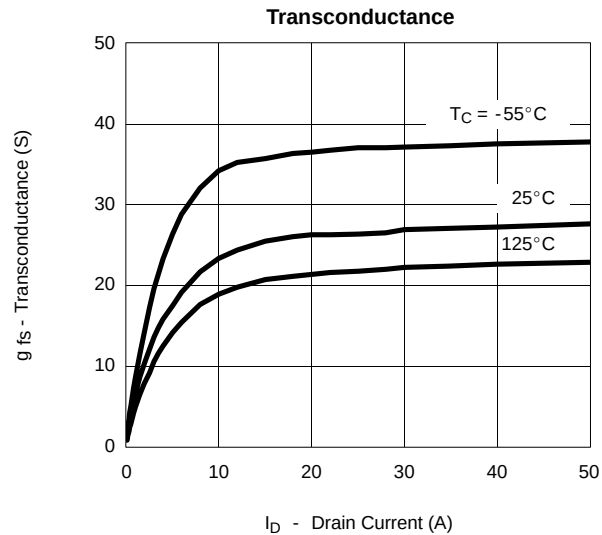
SPECIFICATIONS ($T_J = 25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Parameter	Symbol	Test Condition	Min	Typ ^a	Max	Unit
Static						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	20			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.8		3.0	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 16 V, V _{GS} = 0 V			1	μA
		V _{DS} = 16 V, V _{GS} = 0 V, T _J = 125°C			50	
On-State Drain Current ^b	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	50			A
Drain-Source On-State Resistance ^b	r _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		0.0095	0.012	Ω
		V _{GS} = 10 V, I _D = 20 A, T _J = 125°C			0.0143	
		V _{GS} = 4.5 V, I _D = 15 A		0.021	0.026	
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 20 A	10			S
Dynamic ^a						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 10 V, f = 1 MHz		1000		pF
Output Capacitance	C _{oss}			370		
Reverse Transfer Capacitance	C _{rss}			180		
Gate Resistance	R _G			3.0		Ω
Total Gate Charge ^c	Q _g	V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 50 A		7.5	12	nC
Gate-Source Charge ^c	Q _{gs}			3.5		
Gate-Drain Charge ^c	Q _{gd}			2.6		
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = 10 V, R _L = 0.2 Ω I _D ≅ 50 A, V _{GEN} = 10 V, R _G = 2.5 Ω		11	20	ns
Rise Time ^c	t _r			10	15	
Turn-Off Delay Time ^c	t _{d(off)}			24	35	
Fall Time ^c	t _f			9	15	
Source-Drain Diode Ratings and Characteristic (T _C = 25°C)						
Pulsed Current	I _{SM}				100	A
Diode Forward Voltage ^b	V _{SD}	I _F = 50 A, V _{GS} = 0 V		1.1	1.5	V
Source-Drain Reverse Recovery Time	t _{rr}	I _F = 50 A, di/dt = 100 A/μs		20	40	ns

Notes

- a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

**TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)**

THERMAL RATINGS

